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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/988,937	11/19/2001	Ralf Bohnke	450117-03690	9361

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EXAMINER

DEAN, RAYMOND S

ART UNIT PAPER NUMBER

2618

DATE MAILED: 10/19/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/988,937

Applicant(s)

BOHNKE ET AL.

Examiner

Raymond S. Dean

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 08 September 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 18 - 28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 18 - 28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 November 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on September 8, 2005 has been entered.

### ***Response to Arguments***

2. Applicant's arguments with respect to claims 18, 25, and 26 have been considered but are moot in view of the new ground(s) of rejection.

Keller teaches calculation of modulation schemes to be allocated to the sub-bands, which is the loading table, **prior to** said modulation schemes being allocated to said sub-bands to compensate for a change in the channel condition, which is determined via an estimate of the channel transfer function  $H$ , (See Section II (D. Choice of the Modulation Scheme, 3), 2<sup>nd</sup> – 4<sup>th</sup> paragraphs) thus pre-calculation is taught by Keller. When there is a change in the channel or expected number of bit errors there can be a corresponding change in the modulation scheme allocation of the sub-bands, which can be different loading table. In other words, there are a plurality of combinations of modulation schemes that are allocated to the sub-bands due to the

ever-changing channel conditions thus Keller teaches pre-calculation of a plurality of adaptive loading tables and the selection of the loading table that corresponds to the channel conditions.

***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

4. Claims 18 – 28 are rejected under 35 U.S.C. 102(a) as being anticipated by Keller et al. (Vehicular Technology, IEEE Transactions on, Volume: 49, Issue: 5, Sept 2000, Pages: 1893 – 1906).

Regarding Claim 18, Keller teaches a wireless multi-carrier transmission method, wherein a multi-carrier transmission uses  $n$  modulated frequency sub carriers ( $n$  is an integer number), a fading condition of each sub carrier is detected to generate fading channel profile information (Section II (A. System Model), Section II (D. Choice of the Modulation Scheme, First Paragraph)), the modulation of each sub carrier is determined by the following steps: pre-calculating a plurality of adaptive loading tables, each loading table containing  $x$  sub carriers for modulation with a lower modulation scheme,  $y$  sub carriers for modulation with a standard modulation scheme, and  $z$  sub carriers for modulation with a higher modulation scheme ( $x$ ,  $y$ , and  $z$  are integer numbers) (Section II (D. Choice of the Modulation Scheme, First and Second Paragraph, Section 3), 2<sup>nd</sup> –

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4<sup>th</sup> paragraphs, See Response To Arguments above); wherein the sum of x, y, and z is n and a resulting number of coded bits of a multi-carrier symbol is constant (Section II (D. Choice of the Modulation Scheme, Second Paragraph, Section II (A. System Model, Second Paragraph lines 22 – 23, Third Paragraph lines 1 - 4), Section II (D. Choice of the Modulation Scheme, Section 1, Third Paragraph lines 10 – 16), Section II (F. Sub band Adaptive OFDM and Channel Coding, First Paragraph lines 8 – 13), a desired SNR determines a particular BER which further determines a particular throughput or number of bits per symbol, said throughput or number of bits per symbol corresponds to a particular modulation scheme); selecting one of the adaptive loading tables for said multi-carrier transmission (Section II (D. Choice of the Modulation Scheme, First and Second Paragraph, Section 3), 2<sup>nd</sup> – 4<sup>th</sup> paragraphs, See Also Response To Arguments); and modulating the x sub carriers having low fading channel profile information with the lower modulation scheme, modulating the y sub carriers having medium fading channel profile information with the standard modulation scheme, and modulating the z sub carriers having high fading channel profile information with the higher modulation scheme (Section II (A. System Model), Section II (D. Choice of the Modulation Scheme, First and Second Paragraph, Section 1, Third Paragraph lines 10 – 16)).

Regarding Claim 19, Keller teaches all of the claimed limitations recited in Claim 18. Keller further teaches wherein the transmission power of the sub carriers are adapted such that the total transmission power of all sub carriers remains unchanged (Section II (A. System Model, Second Paragraph Equation (2)), the overall SNR K

comprises the SNRs of all of the sub carriers  $K_{sub\ n}$ , said SNRs  $K_{sub\ n}$  are directly dependent on the transmission power of the sub carriers  $n$  thus when a particular overall SNR  $K$  is desired the transmission power of said sub carriers  $n$  will be adapted to achieve said desired SNR  $K$ ).

Regarding Claim 20, Keller teaches all of the claimed limitations recited in Claim 19. Keller further teaches the transmission power of sub carriers having a higher modulation scheme is enhanced to compensate for sub carriers which are not modulated (Section II (D. Choice of the Modulation Scheme, First Paragraph), Section II (A. System Model, Second Paragraph Equation (2))), the overall SNR  $K$  comprises the SNRs of all of the sub carriers  $K_{sub\ n}$ , said SNRs  $K_{sub\ n}$  are directly dependent on the transmission power of the sub carriers  $n$  thus when a particular overall SNR  $K$  is desired the transmission power of said sub carriers  $n$  will be adapted to achieve said desired SNR  $K$ , when a plurality of said sub carriers  $n$  are not modulated there will be no transmission of said sub carriers  $n$  thus the transmission power of the modulated sub carriers  $n$  will be modified to compensate for the transmission power loss caused by the said non modulated sub carriers  $n$  such that said desired SNR  $K$  is still achieved).

Regarding Claim 21, Keller teaches all of the claimed limitations recited in Claim 18. Keller further teaches adaptive loading information reflecting the adaptation of the modulation scheme of the sub carriers is exchanged between a transmitter and a receiver of the multi-carrier transmission (Figure 1a, Figure 1b, Section I Paragraphs 5 and 6).

Regarding Claim 22, Keller teaches all of the claimed limitations recited in Claim 21. Keller further teaches the receiver calculates a suitable loading based on received signals, - the receiver sends the adaptive loading information in a signaling field and uses the calculated adaptive loading in the data field of a transmitted data train (Figure 1b, Section I Paragraph 5 lines 18 – 21, Section I Paragraph 6 lines 33 – 38, this is a packet based wireless system thus there will be a data train comprising data fields).

Regarding Claim 23, Keller teaches all of the claimed limitations recited in Claim 18. Keller further teaches a plurality of sub carriers is bundled into groups and the same modulation scheme is applied for all sub carriers belonging to the same group (Section II (D. Choice of Modulation Scheme, Second Paragraph lines 1 – 6)).

Regarding Claim 24, Keller teaches all of the claimed limitations recited in Claim 23. Keller further teaches a plurality of adjacent sub carriers is bundled into one group (Section II (D. Choice of Modulation Scheme, Second Paragraph lines 1 – 6)).

Regarding Claim 25, Keller teaches all of the claimed limitations recited in Claim 1. Keller further teaches a computer software program running on a wireless transmitting device (Figure 1a, Figure 1b, Section I Paragraphs 5 and 6, this shows a mobile station and base station configured to employ the AOFDM algorithm, a mobile station comprises wireless transmitting devices such as wireless phones and mobile computers, said phones/computers comprise CPUs that control the operation of said phones/computers, there is software that runs on board said CPUs that enable said CPUs to carry out the required functions, the mobile stations of the AOFDM system will therefore comprise CPUs with on board software that enables said CPUs to run the said

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AOFDm algorithm) for executing wireless multi-carrier transmission multi-carrier that uses  $n$  modulated frequency sub carriers ( $n$  is an integer number), a fading condition of each sub carrier is detected to generate fading channel profile information (Section II (A. System Model), Section II (D. Choice of the Modulation Scheme, First Paragraph)), the program determines the modulation of each sub carrier by the following steps: pre-calculating a plurality of adaptive loading tables, each loading table containing  $x$  sub carriers for modulation with a lower modulation scheme,  $y$  sub carriers for modulation with a standard modulation scheme, and  $z$  sub carriers for modulation with a higher modulation scheme ( $x$ ,  $y$ , and  $z$  are integer numbers) (Section II (D. Choice of the Modulation Scheme, First and Second Paragraph, Section 3), 2<sup>nd</sup> – 4<sup>th</sup> paragraphs, See Response To Arguments above); wherein the sum of  $x$ ,  $y$ , and  $z$  is  $n$  and a resulting number of coded bits of a multi-carrier symbol is constant (Section II (D. Choice of the Modulation Scheme, Second Paragraph, Section II (A. System Model, Second Paragraph lines 22 – 23, Third Paragraph lines 1 - 4), Section II (D. Choice of the Modulation Scheme, Section 1, Third Paragraph lines 10 – 16), Section II (F. Sub band Adaptive OFDM and Channel Coding, First Paragraph lines 8 – 13), a desired SNR determines a particular BER which further determines a particular throughput or number of bits per symbol, said throughput or number of bits per symbol corresponds to a particular modulation scheme); selecting one of the adaptive loading tables for said multi-carrier transmission (Section II (D. Choice of the Modulation Scheme, First and Second Paragraph), Section 3), 2<sup>nd</sup> – 4<sup>th</sup> paragraphs, See Also Response To Arguments above); and modulating the  $x$  sub carriers having low fading channel profile



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information with the lower modulation scheme, modulating the y sub carriers having medium fading channel profile information with the standard modulation scheme, and modulating the z sub carriers having high fading channel profile information with the higher modulation scheme (Section II (A. System Model), Section II (D. Choice of the Modulation Scheme, First and Second Paragraph, Section 1, Third Paragraph lines 10 – 16)).

Regarding Claim 26, Keller teaches a wireless multi-carrier transmission device for a multi-carrier transmission uses n modulated frequency sub carriers (n is an integer number) (Figure 1a, (Section II (A. System Model))), comprising: a fading channel profile unit for detecting a fading condition of each sub carrier (Figure 1a, the channel quality is determined thus there will be a fading channel profile unit for detecting a fading condition); an adaptive loading calculation unit for pre-calculating a plurality of adaptive loading tables, each adaptive loading table containing x sub carriers for modulation with a lower modulation scheme, y sub carriers for modulation with a standard modulation scheme, and z sub carriers for modulation with a higher modulation scheme (x, y, and z are integer numbers) (Section II (D. Choice of the Modulation Scheme, First and Second Paragraph, Section 3), 2<sup>nd</sup> – 4<sup>th</sup> paragraphs, See Response To Arguments above); wherein the sum of x, y, and z is n and a resulting number of coded bits of a multi-carrier symbol is constant (Section II (D. Choice of the Modulation Scheme, Second Paragraph, Section II (A. System Model, Second Paragraph lines 22 – 23, Third Paragraph lines 1 - 4), Section II (D. Choice of the Modulation Scheme, Section 1, Third Paragraph lines 10 – 16), Section II (F. Sub band Adaptive OFDM and Channel Coding,

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First Paragraph lines 8 – 13), a desired SNR determines a particular BER which further determines a particular throughput or number of bits per symbol, said throughput or number of bits per symbol corresponds to a particular modulation scheme); selecting means for selecting one of the adaptive loading tables for said multi-carrier transmission (Section II (D. Choice of the Modulation Scheme, First and Second Paragraph), Section 3), 2<sup>nd</sup> – 4<sup>th</sup> paragraphs, See Also Response To Arguments above); and an adaptive bits-to-symbol mapping unit for modulating x sub carriers having low fading channel profile information with the lower modulation scheme, modulating the y sub carriers having medium fading channel profile information with the standard modulation scheme, and modulating the z sub carriers having high fading channel profile information with the higher modulation scheme (Section II (A. System Model), Section II (D. Choice of the Modulation Scheme, First and Second Paragraph, Section 1, Third Paragraph lines 10 – 16)).

Regarding Claim 27, Keller teaches all of the claimed limitations recited in Claim 26. Keller further teaches the adaptive loading calculation unit bundles respectively a plurality of sub carriers into groups and applies the same modulation scheme on all sub carriers belonging to the same group (Section II (D. Choice of Modulation Scheme, Second Paragraph lines 1 – 6)).

Regarding Claim 28, Keller teaches all of the claimed limitations recited in Claim 27. Keller further teaches the adaptive loading calculation unit (8) bundles a plurality of adjacent sub carriers into one group (Section II (D. Choice of Modulation Scheme, Second Paragraph lines 1 – 6)).

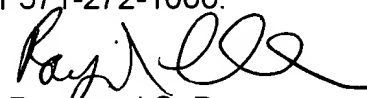
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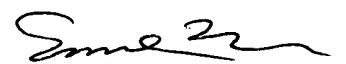
**Conclusion**

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond S. Dean whose telephone number is 571-272-7877. The examiner can normally be reached on Monday-Friday 6:00-2:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward F. Urban can be reached on 571-272-7899. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

  
Raymond S. Dean  
October 5, 2006

  
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